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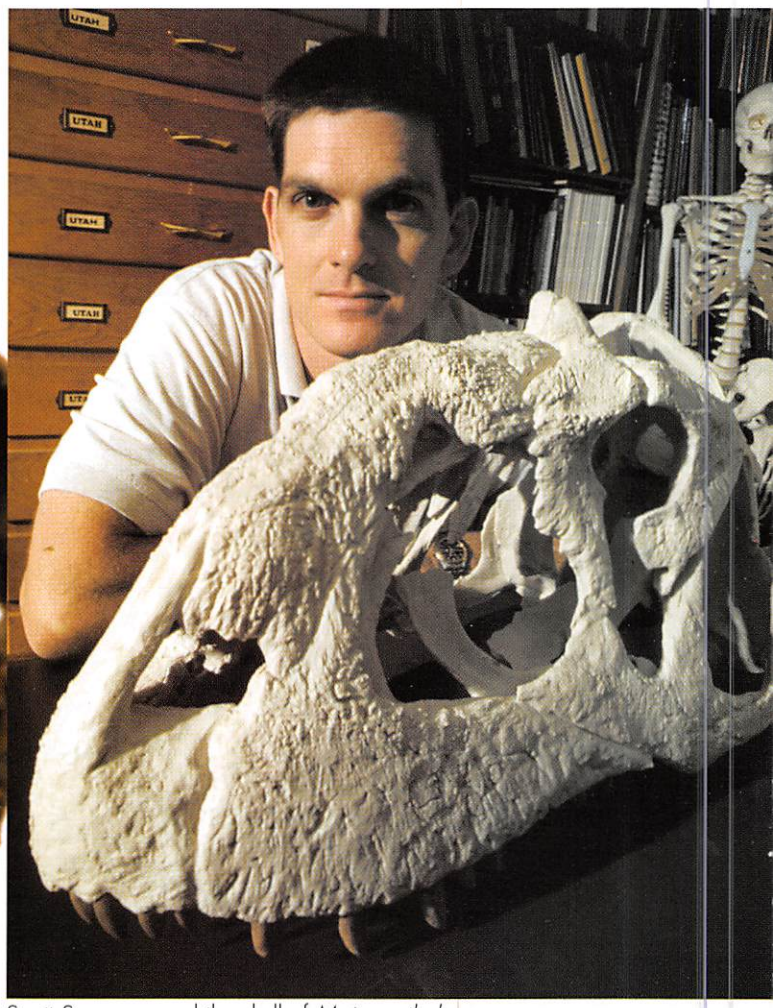

Scott Sampson and the skull of *Majungatholus*

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BY ANN FLOOR

PHOTOS BY DENNIS HAYNES

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Utah Museum of Natural History paleontologist Scott Sampson scours the world for dinosaur remains.

Scott Sampson has been interested in dinosaurs since he was five years old. "*Paleontology* was one of the first words I learned to spell, and I guess I never quite grew up," he says with great enthusiasm. "I've spent my entire adult life travelling around the world digging up bones, and I just keep hunting for more." Indeed, the Utah Museum of Natural History's new paleontologist, who arrived at the U one year ago, is generating new excitement in the science of fossil research.

Take Sampson's most recent discovery, made during the summer of 1999 when he was in Madagascar. It was his fourth trip and he thought most of the big dinosaurs had been found. But walking through the hills one day, he literally stumbled across the remains of what looks to be a brand-new, previously unknown species of carnivorous dinosaur. Sampson's previous field seasons in Madagascar had produced the fossil bird *Rahonavis*, a critical missing link between dinosaurs and birds, and a spectacular skull of the large theropod (carnivorous) dinosaur *Majungatholus*. And he has made other discoveries in Zimbabwe and South Africa, Southern-Hemisphere sites especially rich in undiscovered fossils, as they have not been explored as much as sites in the Northern Hemisphere.

But as Sampson says, "It's not Indiana Jones all the time. After the first couple of days working in 100-degree temperatures, living in a tent with no running water and lots of bugs, the romance wears off. Yet walking around a corner and never knowing if you're going to find something that no human being's ever seen before—that keeps you going."

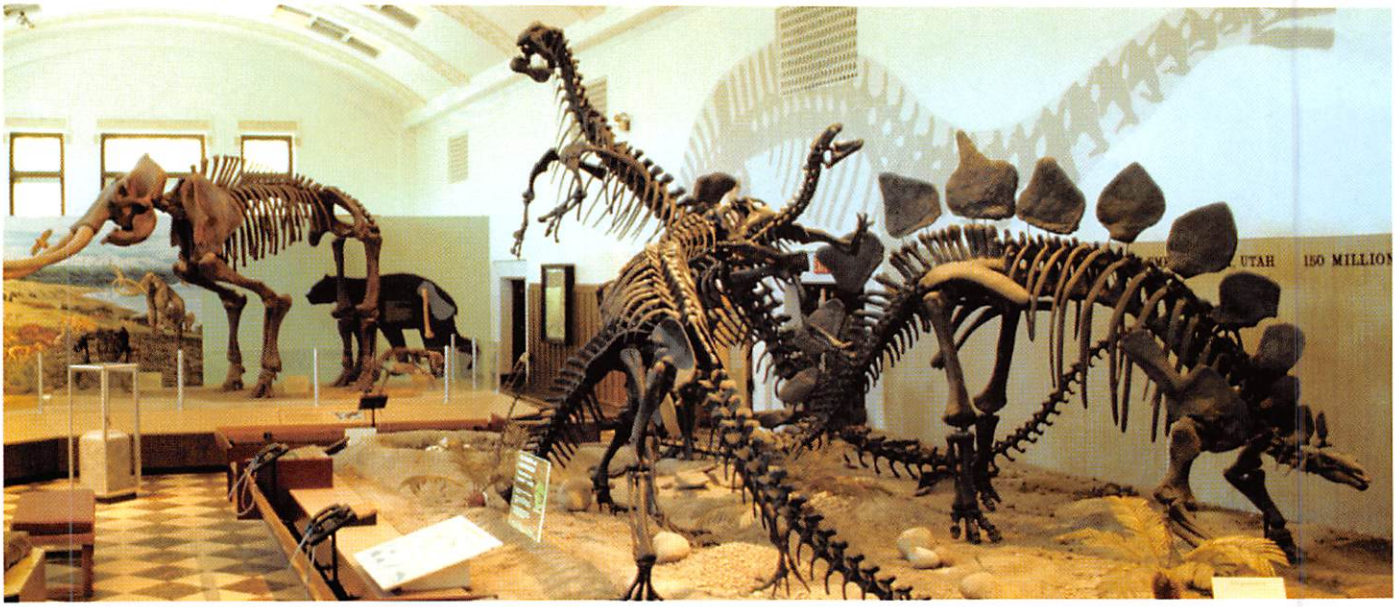
Sampson's work in this hemisphere has yielded some extraordinary finds as well. He described and named two new forms from the Late Cretaceous period (circa 75 million years ago) in Montana. One he named *Einiosaurus*, which means "buffalo lizard" from the Blackfoot Indian word *eini*, meaning buffalo; the other was coined *Achelousaurus* after a Greek river god named Achelous who could change his shape at will.

Last summer, Sampson was offered a dual position as curator of vertebrate paleontology at the Utah Museum of Natural History and assistant professor in the Department of Geology and Geophysics at the U. Sampson, who was born and raised in Vancouver, British Columbia, and worked at the American Museum of Natural History in New York City, likes wearing both hats. "I waited several years for the right position to pop up and couldn't have written a better job description for myself," he says.

The unique arrangement will enable him to bring the science of paleontology to a broad range of graduate and undergraduate students through his teaching, while maintaining his role as museum curator—finding fossils, digging them up, bringing them back to the museum, publishing papers on what is found, and interpreting the findings for the public.

Ann Hanniball, the museum's assistant director for community relations, has worked with Sampson for the past year. "Scott has enormous energy and is endlessly curious," she says. "He thinks globally and understands how paleontology connects to a number of other things. He really has an ecumenical point of view."

As Sampson notes, "Paleontology can be a bridge of understanding between past and present life-forms. And dinosaurs provide an opportunity to access virtually any area of science." Next spring semester, he brings this philosophy to a brand-new course aimed at all undergraduates. The course, "The World of Dinosaurs," will use the study of dinosaurs as a vehicle to teach the nature and process of science. Discussions will go well beyond dinosaurs to include such topics as plate tectonics and ancient climates.



Main exhibit hall, Utah Museum of Natural History

Utah has a strong reputation as an important center for dinosaur research, and the potential to find new animals here is great. Indeed, recently a technician from the University's geology department made a thrilling discovery when he stumbled across what appears to be the first *Tyrannosaurus rex* found in Utah. A few bones have been collected, and the hope is that most of the animal remains to be unearthed. If so, it will be excavated and studied to see if it truly represents *Tyrannosaurus rex* or perhaps some other species of *Tyrannosaurus.*

In Utah, the Cleveland-Lloyd dinosaur quarry (near Castle Dale) and Dinosaur National Monument (adjacent to Vernal) are important sites, but there are some areas in southern Utah that are likely to cause a lot of excitement as well. "We were down in Grand Staircase-Escalante National Monument several weeks ago talking with the monument staff, and in the space of just four hours of wandering around, we found three new kinds of extinct animals, including two new dinosaurs," exclaims Sampson.

Discovering dinosaur fossils is much easier in badlands where rocks are exposed than in grassy fields. Bones can range in color from white to black, with everything in between. And bone is like wood—it has a grain to it. Rocks have a different kind of grain or cross section. "You have to get an eye for it," says Sampson. "You have to be able to separate the rocks from the bones, and sometimes it takes a while to see the difference. But once you know what color and shape to look for, then you can really start to pick things out."

Along with shovels, picks, and brushes, high-tech tools are now used. Global positioning system (GPS) units map the exact location of a site to make it easier to re-find, and a recent technique has successfully employed detection of radioactivity to locate fossils still interred within the sediments.

When a bone is discovered, it's not just picked up off the ground. It's usually fragile and could break into pieces, so it first needs to be stabilized. A solution of glue thinned with acetone is squirted on the fossil to harden it. From there, it's wrapped with plaster and burlap for protection. These plaster jackets, made on-site by members of the field team, provide protection for the fossil during its transport. Together with their ancient contents, the jackets can be as small and light as a pencil or as massive as a multi-ton truck, so moving them can be a challenge.

Once the specimen is safely back at the museum, the fossils are prepared in the Paleo Lab, a glass-walled room that allows visitors to observe the students and volunteers at work. Preparation involves removing the plaster jacket and the matrix, the rock-like material found in the cavities of the fossil skeleton. One vertebra can weigh over 50 pounds and take five or six weeks to prepare, so the preparation can take months to complete, depending on the size of the animal.

The lab is managed by Mike Getty, collections manager and chief preparator for the museum, who was recruited last October from the Royal Tyrrell Museum of Paleontology in Alberta. Getty oversees a volunteer staff of more than 40 people in the Paleo Lab, and runs the field camp during fossil-hunting season. "I like the fossils because they represent worlds that came before us," he says. "It's not often you can get in touch with something like that."

Evolving technology is providing new possibilities in dinosaur research. Although DNA testing is not yet routinely used, it may be in the future. Recent discoveries have identified actual bio-molecules that have been preserved in fossils. The sheath on the claw of the fossil bird *Rahonavis* was found to include original organic material—preserved for 72 million years.

Scientists are beginning to document the existence of these astounding soft tissue findings. The journal *Science* recently announced the discovery of a fossilized dinosaur heart


Monica Castro BS'97 at work in the Paleo Lab

from Montana. Because no one had really been looking for remains of such soft tissue materials in the past, they weren't being found. It's similar to the emergence of dinosaur egg discoveries. For years, no one thought to look for baby dinosaurs or for dinosaur eggshells. Then suddenly, after being recovered in a few places, they began to appear all over the world.

The museum's collection of Jurassic-age fossils is significant and includes both herbivorous and carnivorous dinosaurs. But Utah undoubtedly has a plethora of fossils that remain to be discovered, and the museum wants to bring some of those specimens in, build up the collection, and do the related research and education.

"So much of Utah remains to be explored," says Sampson. "The fossils that are collected and brought to the museum will be kept forevermore for people to enjoy." Sampson says that many people don't realize that over 99 percent of all the animals that have ever existed on this planet are now extinct. "Extinction is not only common, it is the norm—the inevitable. The ironic thing is that people use dinosaurs as the icon of failure. Yet dinosaurs were the dominant land animals for about 150 million years, whereas humans have been around for less than one million years." In short, we have barely begun to tap into the prehistory of this state, and the museum plans to fill major gaps in our knowledge.

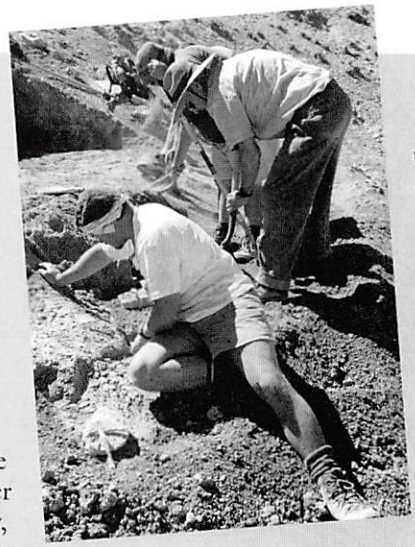
Since 65 percent of Utah is federally owned, most of the field research in the natural sciences is being carried out on federally managed public lands. This means that the museum and the federal government are partners in science. Testament to this partnership is the fact that more than 75 percent of the museum's million-plus objects and specimens, and 90 percent of its vertebrate fossils, were recovered from public lands. The museum staff preserves these federal specimens and provides scientific interpretations to the public through exhibits at the museum as well as through outreach programs, such as the travelling field crates—many filled with dinosaur-related objects—that go to schools throughout Utah.

The museum has begun a capital campaign to raise money for a new natural history museum to be built on 14 acres in Research Park. If all goes well, groundbreaking will begin in 2004 or 2005 with completion two years later. A new museum would strengthen science for the entire state of Utah. As Sampson remarks, "There really isn't a large, full-scale natural history museum in this state. And if you look around, this state is nothing *but* natural history—it deserves to be well represented."

The Utah Museum of Natural History welcomes volunteers. For more information, call (801) 581-6927.

—Ann Floor, who last wrote about international conservation efforts at the U for Continuum *(Fall 1998), is a freelance writer.*

A Day at a Dig



We pull off the road in the mountains west of Castle Dale in our camouflage truck (an Army Surplus special) with its extra-wide cab. There's not an extra thing inside except the boombox Mike Getty has rigged so he can play his tapes of a Canadian band that sounds Irish.

Mike, collections manager for the Utah Museum of Natural History, points to a hill in the distance and tells us our quarry is somewhere up there in the rock outcropping. There are five of us today. We walk through a flat meadow and up a bone-dry streambed, then up the solid rock "tongue" of the boulder-covered hillside to a plateau on top. The view is spectacular. We walk across the plateau and start down the backside. Just over the edge, below a huge boulder precariously perched on fragile support rocks, is our site, which has been prepared for our visit. A four-foot-deep, 12-foot-long, and eight-foot-wide shelf has been carved out of the side of the hill.

Several shovels and a big pickax stand in the shaded corner of the site. Mike takes our water bottles and puts them with our lunches inside a shallow cave to keep them cool. The sun is getting hot. We go to work.

First, we finish scraping the loose dirt off the floor of the shelf with a shovel. Then we use our awl and hammer to tap very carefully, taking off the earthen floor of the shelf in tiny layers, one inch deep at a time. I sweep away the loose dirt with a whisk broom.

As I'm working, I notice a bright, almost electric, baby-blue chip below my hammer. This is unmistakably a dinosaur bone. The clear blue is so different from the other, more muted colors of dirt and stone.

Once I know it's a bone fragment, I switch immediately to the one-inch soft paintbrush and carefully brush around the bone. We are firmly instructed not to touch the fragments. We continue the work all morning. By lunch, Mike has found a substantial bone, and others have found fragments. We stop to eat, sitting in a line, our backs against the dark cool wall of the earthen shelf. Some of us take a few photos, then we go back to work.

By the end of the day, we have made a second shallow "step" across the length of the shelf. Mike asks us to carve moats around our findings to protect them from being washed down the mountain in case it rains before he can come back. Each little mound of rice- and pea-sized fossil flakes has its own plateau with a protective trench around it to guide the water away.

By now I'm tired and dehydrated but excited, too. What if my hammer's tap is the first step toward a major find? We hike back up the hill and down the other side and back to the truck. Time to think about dinner.

—Ann Floor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